

The Role of Kinetic Processes in Magnetospheric Dynamics

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The question of whether the microscale controls the macroscale or vice-versa remains one of the most challenging problems in plasmas. A particular topic of interest within this context is collisionless magnetic reconnection, where both points of views are espoused by different groups of researchers. This presentation will focus on this topic. We will begin by analyzing the global properties of magnetic reconnection. Following that, we discuss properties of electron diffusion region dynamics both for guide field and anti-parallel reconnection, and how they can be scaled to different inflow conditions. As a next step, we will study typical temporal variations of the microscopic dynamics with the objective of understanding the potential for secular changes to the macroscopic system. The research will be based on a combination of analytical theory and numerical modeling.